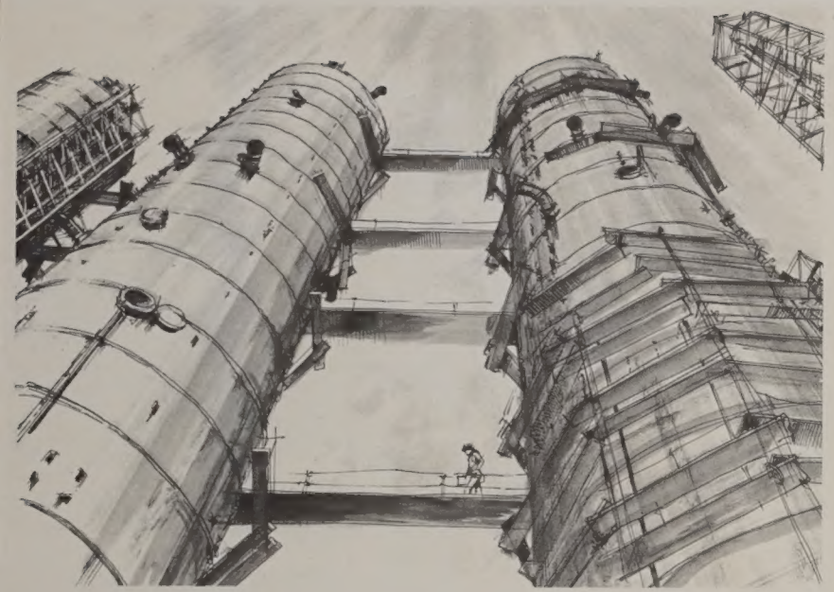


heavy water

The Bruce heavy water production plant, being built by AECL and to be operated by Ontario Hydro, will produce 800 tons of heavy water a year.

Lummus Company of Canada Limited is acting for AECL as engineer constructor. The first 400-ton stage of the plant is scheduled for operation in 1972.

Heavy water is used in Canadian reactors as a moderator to slow down the neutrons which sustain the chain reaction. It is a highly efficient moderator, many times more so than ordinary water or graphite used in other reactor systems.

Heavy water looks and tastes like ordinary water (H_2O) but contains heavy hydrogen (deuterium) atoms which are twice as heavy as ordinary hydrogen atoms.

Chemically known as deuterium oxide (D_2O), it occurs naturally at a ratio of one part to 7,000 in ordinary water. It is separated from ordinary water by a gas-water exchange process. Each Bruce reactor will require 670 tons of heavy water.

Steam from the existing Douglas Point station and later from the Bruce station will be used to run the heavy water plant. An auxiliary steam plant is also being built to ensure full production from the D_2O plant.

bruce nuclear power development

Four separate facilities are located on the 2,300-acre site between Kincardine and Port Elgin:

Bruce Generating Station

Owner	Ontario Hydro
Nuclear Designer	Atomic Energy of Canada Limited
Operator	Ontario Hydro
Output	3,200,000 kilowatts

Douglas Point Generating Station

Owner	Atomic Energy of Canada Limited
Operator	Ontario Hydro
Output	200,000 kilowatts

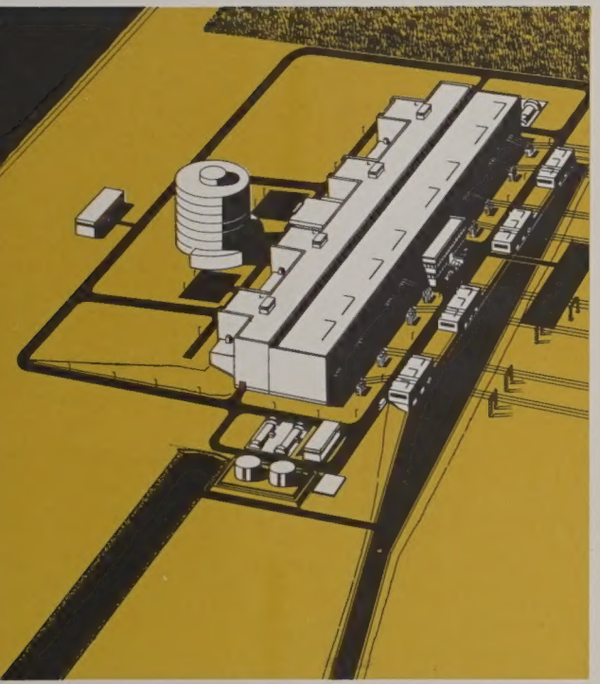
Bruce Heavy Water Plant

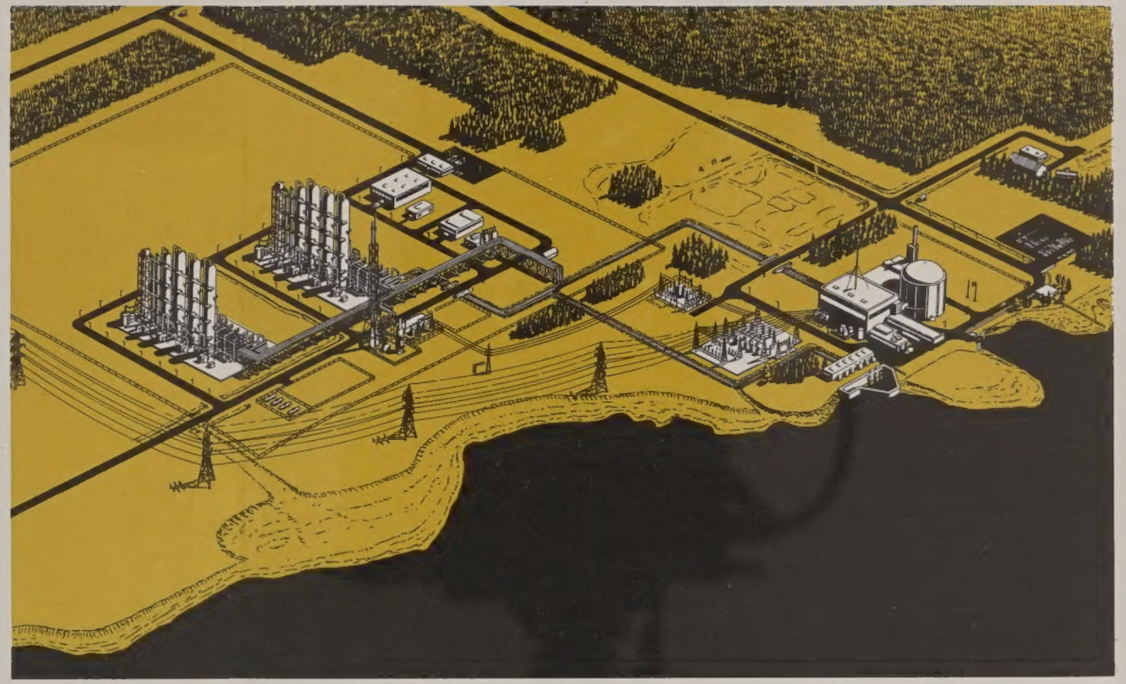
Owner	Atomic Energy of Canada Limited
Operator	Ontario Hydro
Output	800 tons a year

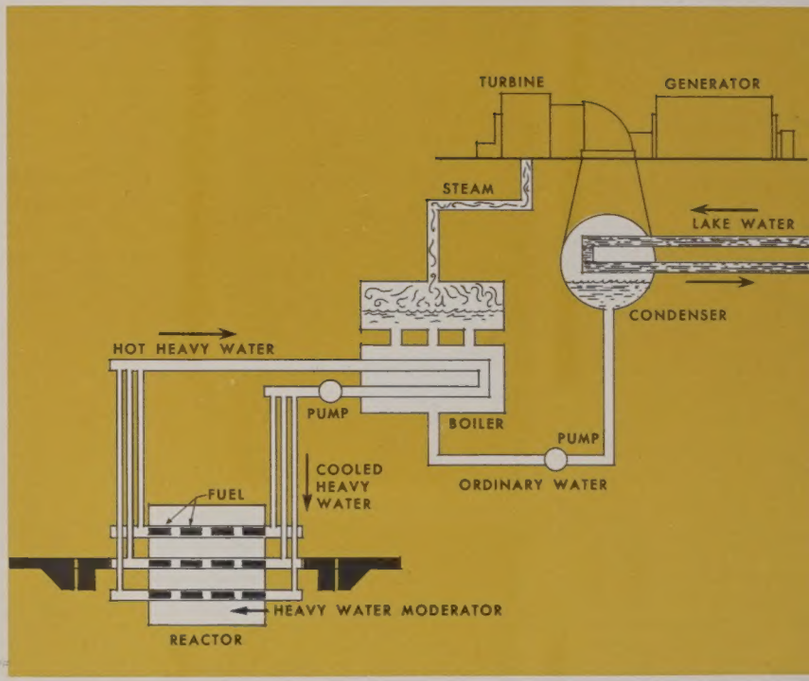
Auxiliary Steam Plant

Owner	Atomic Energy of Canada Limited
Operator	Ontario Hydro
Output	2,500,000 lbs. steam an hour

bruce nuclear power development







canada's nuclear capital

The Bruce nuclear power development, located on the shore of Lake Huron between Port Elgin and Kincardine, will become Canada's nuclear capital in the 1970's.

The centre will include the new 3,200,000-kilowatt Bruce power station, a large heavy water production plant, an auxiliary steam plant and the existing Douglas Point plant, Canada's first full-scale nuclear station which began producing power early in 1967.

The Bruce nuclear station, one of the largest in the world, will be part of a complex representing a total investment of about one billion dollars. A work force of 3,500 will be engaged on the project by 1974.

The CANDU reactors, designed by Atomic Energy of Canada Limited, make use of Canada's plentiful supplies of natural uranium moderated and cooled by heavy water. Their features include the lowest fuelling cost of any reactor system and high energy yield from the atom-splitting process. A single fuel bundle provides enough electric energy to supply a residential customer for 150 years. Each reactor contains 6,240 such bundles.

The reliability of Canadian reactors has been proven at the small Nuclear Power Demonstration plant, located at Rolphton on the Ottawa River, which first produced power in 1962. Next step was construction of the 200,000-kilowatt Douglas Point station. The Pickering station, with a capacity of 2,160,000 kilowatts, is under construction east of Toronto. The first of its four 540,000-kilowatt units was started up early in 1971.

Starting in 1975, the first of the four 800,000-kilowatt units at the Bruce station will feed electricity into Ontario Hydro's high voltage network along a new 500,000-volt line.

AECL is designing the nuclear part of the station; Ontario Hydro will own, construct and operate the plant in addition to designing the remainder of the station.

The station will incorporate a number of design changes and refinements based on experience with CANDU reactors and a 50 per cent increase in size over the Pickering units. These will reduce cost, improve efficiency of plant operation and maintenance, and increase flexibility and availability of the station to meet fluctuating power demands.

A new feature will be a simplified fuel-handling system comprising only two fuelling units. Both units can fuel any of the four reactors.

Experience with NPD and the first Douglas Point station has led to significant cost reductions. For example, fuel cost for the new Bruce station will be about seven-tenths of a mill per kilowatt-hour, compared with more than three mills for a coal-fired station.

Electricity from the CANDU-type plants in the province helps Ontario Hydro to meet demands,which double about every 10 years.

electricity from the atom

The reactor is a steel tank filled with heavy water through which pass horizontal tubes. Remotely-controlled fuelling machines feed uranium fuel bundles into the tubes.

Neutrons given off by the fuel are slowed by collisions with heavy water molecules, like a ball bouncing off others on a billiard table. A U235 atom captures the slow neutron, splits and releases more neutrons. This chain reaction of atom splitting results in a high, steady heat.

In a separate system, heavy water coolant is pumped through pressure tubes to carry off the heat produced in the fuel to the station boilers. There, the hot heavy water turns ordinary water into steam. The steam is fed to a conventional steam turbine which drives an electric generator.

The new Bruce reactors will have 480 fuel channels compared with 306 in the Douglas Point station.

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